

CHANGES TO THE CLAIMS

IN THE CLAIMS

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1. (Original) A perpendicular magnetic recording medium comprising:

a nonmagnetic substrate;

an underlying film formed on said nonmagnetic substrate; and

a perpendicular magnetic layer formed on said underlying film, wherein said underlying film has a layer exhibiting a super paramagnetism.

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2. (Currently Amended) The perpendicular magnetic recording medium according to claim 1, wherein said layer exhibiting a super paramagnetism ~~is formed of fine particles exhibiting a super paramagnetism of a soft magnetic material~~ mainly contains fine particles of said soft magnetic material.

3. (Currently Amended) The perpendicular magnetic recording medium according to claim 1 ~~2~~, wherein ~~said layer exhibiting a super paramagnetism has a granular structure having fine particles exhibiting a super paramagnetism of a soft magnetic material dispersed in a nonmagnetic matrix~~ said fine particles are dispersed in a nonmagnetic matrix to form a granular structure.

4. (Original) The perpendicular magnetic recording medium according to claim 1, wherein said layer exhibiting a super paramagnetism has a saturation magnetization under the applied magnetic field not higher than 3980 A/m in respect of the order of 10^{-8} second corresponding to the magnetic field reversal time of a recording head and the magnetization is

not saturated under the applied magnetic field not higher than 796,000 A/m relative to the order of one second or more.

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5. (Original) The perpendicular magnetic recording medium according to claim 1, wherein said layer exhibiting a super paramagnetism exhibits a soft magnetic properties under the temperature not higher than 10K and exhibits a paramagnetism under the temperature around room temperature.

6. (Original) The perpendicular magnetic recording medium according to claim 1, wherein the magnetization of said layer exhibiting a super paramagnetism is not saturated under the temperature around room temperature and under the applied magnetic field not higher than 796,000 A/m, and the layer exhibiting a super paramagnetism has a saturation magnetization under the temperature not higher than 10K and under the applied magnetic field not higher than 3980 A/m.

7. (Original) A perpendicular magnetic recording-reproducing apparatus comprising:
a perpendicular magnetic recording medium;
driving means for supporting and rotating the perpendicular magnetic recording medium;
a magnetic head including an element for recording information in the perpendicular magnetic recording medium and an element for reproducing the recorded information; and
a carriage assembly supporting said magnetic head which is movable relative to the perpendicular magnetic recording medium, wherein the perpendicular magnetic recording medium comprises a nonmagnetic substrate, an underlying film formed on the nonmagnetic

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substrate and having a layer exhibiting super paramagnetism, and a perpendicular magnetic layer formed on the underlying film.

8. (Once Amended) The perpendicular magnetic recording-reproducing apparatus according to claim 7, wherein said layer exhibiting a super paramagnetism is formed of fine particles exhibiting a super paramagnetism of a soft magnetic material mainly contains fine particles of said soft magnetic material.

9. (Once Amended) The perpendicular magnetic recording-reproducing apparatus according to claim 7 8, wherein ~~said layer exhibiting a super paramagnetism has a granular structure having fine particles exhibiting a super paramagnetism of a soft magnetic material dispersed in a nonmagnetic matrix~~ said fine particles are dispersed in a nonmagnetic matrix to form a granular structure.

10. (Original) The perpendicular magnetic recording-reproducing apparatus according to claim 7, wherein said layer exhibiting a super paramagnetism has a saturation magnetization under the applied magnetic field not higher than 3980 A/m in respect of the order of 10^{-8} second corresponding to the magnetic field reversal time of a recording head and the magnetization is not saturated under the applied magnetic field not higher than 796,000 A/m relative to the order of one second or more.

11. (Original) The perpendicular magnetic recording-reproducing apparatus according to claim 7, wherein said layer exhibiting a super paramagnetism exhibits a soft magnetic properties

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under the temperature not higher than 10K and exhibits a paramagnetism under the temperature around room temperature.

12. (Original) The perpendicular magnetic recording-reproducing apparatus according to claim 7, wherein the magnetization of said layer exhibiting a super paramagnetism is not saturated under the temperature around room temperature and under the applied magnetic field not higher than 796,000 A/m, and the layer exhibiting a super paramagnetism has a saturation magnetization under the temperature not higher than 10K and under the applied magnetic field not higher than 3980 A/m.

13. (New) The perpendicular magnetic recording medium according to claim 1 wherein said layer exhibiting super paramagnetism contains one soft magnetic material selected from the group consisting of FeTaC, FeZrO, CoFe, NiFe, CoZrNb, FeTaN, and FeZrN.

14. (New) The perpendicular magnetic recording medium according to claim 1, wherein said layer exhibiting super paramagnetism has a magnetization not larger than 20 emu/cm² when a magnetic field of 796,000 A/m is applied.

15. (New) The perpendicular magnetic recording medium according to claim 2, wherein said fine particles has a particle diameter not larger than 40nm.

16. (New) The perpendicular magnetic recording medium according to claim 3, wherein said nonmagnetic matrix contains one material selected from the group consisting of Ag, Ti, Ru, C, SiO₂, SiO, Si₃N₄, Al₂O₃, AlN, TiN, BN, CaF and TiC.

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17. (New) The perpendicular magnetic recording-reproducing apparatus according to claim 7, wherein said layer exhibiting super paramagnetism contains one soft magnetic material selected from the group consisting of FeTaC, FeZrO, CoFe, NiFe, CoZrNb, FeTaN, and FeZrN.

18. (New) The perpendicular magnetic recording-reproducing apparatus according to claim 7, wherein said layer exhibiting super paramagnetism has a magnetization not larger than 20 emu/cm² when a magnetic field of 796,000 A/m is applied.

19. (New) The perpendicular magnetic recording-reproducing apparatus according to claim 8, wherein said fine particles has a particle diameter not larger than 40nm.

20. (New) The perpendicular magnetic recording-reproducing apparatus according to claim 9, wherein said nonmagnetic matrix contains one material selected from the group consisting of Ag, Ti, Ru, C, SiO₂, SiO, Si₃N₄, Al₂O₃, AlN, TiN, BN, CaF and TiC.